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containing polymer particles from a solution of the polymer and of the dye in a water-miscible organic solvent by addition of an aqueous phase.

B3
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2
~~14.~~ (Amended) A process as claimed in Claim ~~12~~¹, wherein the polymer contains (in each case based on the total weight of the polymer) from 30 to 100 % by weight of at least one monomer a, from 0 to 60 % by weight of at least one monomer b having polar groups and from 0 to 30 % by weight of at least one further monomer c, different from monomer a, in polymerized form.

B4
sub
3
~~16.~~ (Amended) A process as claimed in Claim ~~14~~³, wherein the monomer b is selected from the group consisting of α,β -ethylenically unsaturated C₃-C₈-monocarboxylic acids, α,β -ethylenically unsaturated C₄-C₈-dicarboxylic acids with C₁-C₁₂-alkanols and anhydrides thereof, aromatic vinylcarboxylic acids, monoethylenically unsaturated sulfonic acids and phosphonic acids, esters of α,β -ethylenically unsaturated C₃-C₈-monocarboxylic acids with amino-C₂-C₈-alkanols, mono-C₁-C₄-alkylamino-C₂-C₈-alkanols or di-C₁-C₄-alkylamino-C₂-C₈-alkanols, N-vinyl lactams and esters of α,β -ethylenically unsaturated C₃-C₈-monocarboxylic acids with C₂-C₈-hydroxyalcohols or the ethoxylated or propoxylated derivatives thereof.--

REMARKS

Claims 12-16 are active in the case. Reconsideration is respectfully requested.

Applicants' representative wishes to thank Examiner Lee for the helpful and courteous interview dated February 21, 2002. As a result of the discussion, it is believed that prosecution of the application has been materially advanced and that the issues in the case have been clarified.

The present invention relates to a method of preparing dye-containing polymer particles of at least one dye in a matrix of an essentially water-insoluble polymer.

Claim Objection

The objection raised with respect to Claim 14 is obviated by the amendment made to the same in which correct reference to monomer a is now made. Withdrawal of the objection is respectfully requested.

Claim Rejection, 35 U.S.C. 112

The basis for the rejection of the claim is believed obviated by the insertion of the conjunction "and" in the penultimate line of the claim and by the substitution of the conjunction "or" in the last line of the claim.

Further, Claim 12 has been amended in order to further clarify the claim as to the fact that the polymer is a dye-containing polymer. None of the amendments made to the claims introduce new matter therein.

The present invention is directed to a method of preparing water-insoluble dyes having a small particle size and a narrow particle size distribution which are useful in printing media. The method of the present invention provides for the preparation of dye-containing polymer particles containing at least one dye in a matrix of an essentially water-insoluble polymer and having an average particle size within the range from 5 nm to 5 μ m by precipitating the dye-containing polymer particles from a solution of the polymer and of the dye in a water-miscible organic solvent by addition of an aqueous phase to the organic solvent medium.

Prior Art Rejection

Claims 12-15 stand rejected based on 35 U.S.C. 103(a) as obvious over Nair et al, U.S. Patent 4,833,060 in view of Reeder U. S. Patent 4,264,656. This ground of rejection is respectfully traversed.

The Nair et al disclosure describes polymeric powders which are useful as electrophotographic toners and carrier particles and a method of preparing the powder. As described in column 2, lines 21-40, the technique of the patent is to form a solution of a polymer in a solvent that is **immiscible** in water (and possibly a pigment) and then **dispersing** the polymer/solvent combination in water containing a promoter and silica particles. Accordingly, what is formed at this point of the process is a **dispersion** of fine polymer/solvent particles in an aqueous medium. Further on in the process, after subjecting the dispersion to high shear to reduce the size of the particles, the water immiscible solvent is removed (evaporation) (lines 37-40), and then the solid polymer particles containing silica (and dye) are recovered. Clearly, this process is quite unlike that of the present invention which to the contrary employs a water **miscible** solvent as the medium in which the water insoluble polymer and dye are dissolved, and, rather than evaporating solvent from finely dispersed particles in an aqueous medium to form solid particles which are then filtered, water is added to the solvent medium which reduces the amount of organic solvent necessary to dissolve the polymer and precipitation of the product polymer containing dye from the organic solvent medium results.

The deficiencies of the Nair et al are neither overcome or improved upon by Reeder. Reeder, in fact, is directed to a different technical field than that of Nair et al, because the technology of Reeder is that of water-based coating compositions while as noted above, Nair

et al is of the field of dye containing particles for use in electrophotography! As disclosed in column 1, lines 43-50 of the patent, the composition of the patent can be a stable colloidal dispersion or an emulsion. An option for the dispersion is that it contain "up to its own weight" of a water miscible solvent, **although it is preferred not to use an organic solvent.** Note further that the **aqueous dispersion should be infinitely dilutable with water without coagulation or precipitation.** In view of such a disclosure, what motivation is provided by Reeder that would lead the skilled artisan to not only selected the organic solvent of the system of Reeder, which in fact is optional, and use this type of solvent as a substitute for an organic solvent of a fundamentally different type, i.e., a water immiscible solvent, in the process of Nair et al which in fact requires a water immiscible solvent rather than a the water miscible type of solvent for the disclosed process in which at one stage the water immiscible solvent is evaporated while in aqueous dispersion to form solid fine particles of dye containing polymer particles? Applicants, in fact, submit that the two patents can not be properly combined because the systems disclosed in each are quite different. Withdrawal of the rejection is respectfully requested.

Claims 12-16 stand rejected based on 35 U.S.C. 103(a) as obvious over Nair et al, U.S. Patent 4,833,060 in view of Reeder U. S. Patent 4,264,656. This ground of rejection is respectfully traversed.

The rejection of Claims 12-16 is traversed for the same reasons as advanced above for the rejection of Claims 12-15. Withdrawal of the rejection is respectfully requested.

Claims 12, 14 and 15 stand rejected based on 35 U.S.C. 103(a) as obvious over Ober et al, U.S. Patent 4,692,188 in view of Reeder U. S. Patent 4,264,656. This ground of rejection is respectfully traversed.

The Ober et al patent describes ink compositions which are prepared by a process which in some way parallels the process disclosed in Nair et al for producing solid particles for use in electrophotographic applications. As described in column 4, lines 28-50, a polymer and an oil soluble dye are dissolved in a water immiscible organic solvent. A solution of water and surfactant is added and a dispersion is formed of an oil phase of organic solvent, dye and polymer in the aqueous phase. Thereafter, the organic solvent is evaporated as in the process of Nair et al, but then the particles of the dye-in-polymer are obtained separately. Rather, an aqueous ink formulation is formed which contains the dye-in-polymer particles. However, in the system of Ober et al, the same is **only functional or operative** if a water immiscible organic solvent is used and **not** a water miscible solvent. In the present process, an important feature is that the dye containing polymer particles are obtained by precipitation as water is added to the organic solvent based system, and this technique would not be operative if a water immiscible solvent were to be used as taught by Ober et al. Clearly, Ober et al does not suggest the process of the present invention.

The deficiencies of Ober et al are neither overcome nor improved upon by Reeder et al for the same reasons as mentioned above in that the field of technology of Reeder is quite different from that of Ober et al and in fact the two references are not properly combinable.

Claims 12-16 stand rejected based on 35 U.S.C. 103(a) as obvious over Nair et al, U.S. Patent 4,833,060 in view of Reeder U. S. Patent 4,264,656. This ground of rejection is respectfully traversed.

Claim 12 stands rejected based on 35 U.S.C. 103(a) as obvious over Micale, U.S. Patent 4,665,107 in view of Reeder U. S. Patent 4,264,656. This ground of rejection is respectfully traversed.

The Micale patent discloses a pigment encapsulated aqueous latex colorant dispersion which is formulated of an aqueous continuous phase discontinuous, micron sized droplet phase wherein the droplets are composed of solvent/polymer/pigment. This is reminiscent of the dispersion of Ober et al wherein an oil soluble dye and a polymer are dissolved in a water immiscible solvent. In fact, like the process disclosed in Ober et al, organic solvent is removed by evaporation, thereby producing an aqueous writing fluid after some water has been removed to prepare the fluid of appropriate writing fluidity. Again there is no teaching or suggestion in Micale of a method of forming dye-containing polymer particles which are produced by a process in which an organic solvent is used which is miscible in water, thereby allowing the production of the dye-containing polymer particles of appropriate particle size as water is added to the organic solvent medium to cause precipitation of the particles. Accordingly, Micale does not show or suggest the process as claimed in the present invention.

Applicants again apply their comments above concerning Reeder as this patent does not overcome or improve upon the teachings of Micale with respect to the present invention. Withdrawal of the rejection is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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MARKED-UP COPY OF AMENDMENT

IN THE CLAIMS

Please amend Claims 12, 14 and 16 as follows:

--12. (Amended) A process for preparing dye-containing polymer particles containing at least one dye in a matrix of an essentially water-insoluble polymer and having an average particle size within the range from 5 nm to 5 μ m, which comprises precipitating the dye-containing polymer particles from a solution of the polymer and of the dye in a water-miscible organic solvent by addition of an aqueous phase.

14. (Amended) A process as claimed in Claim 12, wherein the polymer contains (in each case based on the total weight of the polymer) from 30 to 100 % by weight of at least one [polymer] monomer a, from 0 to 60 % by weight of at least one monomer b having polar groups and from 0 to 30 % by weight of at least one further monomer c, different from monomer a, in polymerized form.

16. (Amended) A process as claimed in Claim 14, wherein the monomer b is selected from the group consisting of α,β -ethylenically unsaturated C₃-C₈-monocarboxylic acids, α,β -ethylenically unsaturated C₄-C₈-dicarboxylic acids with C₁-C₁₂-alkanols and anhydrides thereof, aromatic vinylcarboxylic acids, monoethylenically unsaturated sulfonic acids and phosphonic acids, esters of α,β -ethylenically unsaturated C₃-C₈-monocarboxylic acids with amino-C₂-C₈-alkanols, mono-C₁-C₄-alkylamino-C₂-C₈-alkanols or di-C₁-C₄-alkylamino-C₂-C₈-alkanols, N-vinyl lactams [,] and esters of α,β -ethylenically unsaturated C₃-C₈-

monocarboxylic acids with C₂-C₈-hydroxyalcohols [and] or the ethoxylated or propoxylated derivatives thereof.--

ABSTRACT OF THE DISCLOSURE

B¹ Dye-containing polymer particles of at least one dye in a matrix of an essentially water-insoluble polymer and having an average particle size within the range from 5 nm to 5 μm are prepared by a process which comprises precipitating the dye-containing polymer particles from a solution of the polymer and of the dye in a water-miscible organic solvent by addition of an aqueous phase thereto.
